Draft Guidance on Quantitative PM Hot-spot Analyses for Transportation Conformity

U.S. Environmental Protection Agency

Draft released May 26, 2010

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Outline

- Background
- Overview of draft guidance
- PM hot-spot analysis example
- Outreach and future training

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Conformity Background

- Conformity rule requires a PM hot-spot analysis for projects of local air quality concern (major new projects with significant diesel traffic) e.g.:
  - A highway with significant truck traffic, or
  - A regional transit terminal with a large diesel bus fleet
- CAA section 176(c) requires that federally supported new transportation projects in $PM_{2.5}$ and PM_{10} nonattainment and maintenance areas cannot:
  - Cause or contribute to new NAAQS violations,
  - Worsen NAAQS violations, or
  - Delay timely attainment of NAAQS or interim milestones
- ***Qualitative*** PM hot-spot analyses are currently required

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Purpose of Guidance

- Draft guidance describes how to determine the local air quality impacts of transportation projects on $PM_{2.5}$ and PM_{10} NAAQS in the "project area"
  - Emissions from the project and nearby sources
  - Background from other sources
- Will not change existing conformity requirements (e.g., does not change what projects require a PM hot-spot analysis)
- Final guidance required by the conformity rule before ***quantitative*** PM hot-spot analyses apply

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Guidance Schedule

- On May 26, EPA announced in the Federal Register that the draft PM hot-spot guidance was posted on EPA's website for public comment by July 19
  - Comments can be sent to PMhotspot-comments@epa.gov
  - Federal Register notice, draft guidance, and fact sheet available at: www.epa.gov/otaq/stateresources/transconf/policy.htm
- EPA will issue final guidance later this year and plans to establish conformity grace period before project-level analyses are required using MOVES (or EMFAC)
  - Grace period would start from publication date of a future Federal Register notice announcing release of final guidance
  - EPA will also release separate CO project-level MOVES guidance

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EPA's Coordination for Draft Guidance

- Several EPA offices involved
- FHWA and FTA
- CARB and Caltrans for EMFAC section
- Conference calls with stakeholder groups

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Build/No-build Analyses

- In general, a PM hot-spot analysis compares AQ concentrations with the proposed project (the build scenario) to AQ concentrations without the project (the no-build scenario)
- Build scenario cannot produce new NAAQS violations, worsen existing NAAQS violations, or delay timely attainment as compared to no-build scenario
- Project meets conformity requirements, if at each appropriate receptor:

  PM concentration of build $\leq$ NAAQS or PM concentration of no-build

- For example, conformity would be met at a receptor in a 2006 $PM_{2.5}$ NAAQS area if:
  - NAAQS: 35 $\mu g/m^3$
  - Build (with project) 36 $\mu g/m^3$
  - No-build (without project) 37 $\mu g/m^3$

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Agencies Involved in PM Hot-spot Analyses

- The project sponsor (e.g., a state DOT or transit agency) is the lead agency in developing the analysis
- FHWA/FTA make the project-level conformity determination and provide technical assistance
- EPA writes the conformity regulations and provides technical assistance
- State and local AQ agencies and MPOs may provide data to be used in hot-spot analyses (varies per area)
- All agencies involved in the interagency consultation process (an essential part of PM hot-spot analyses)
- See Section 2 of draft guidance for more background

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Overview of a PM Hot-spot Analysis

- Step 1: Determine need for analysis
- Step 2: Determine approach, models, and data
- Step 3: Estimate on-road motor vehicle emissions
- Step 4: Estimate dust and other emissions (when necessary)
- Step 5: Select AQ model, data inputs and receptors
- Step 6: Determine background concentrations
- Step 7: Calculate design values and compare build/no-build results
- Step 8: Consider mitigation or control measures (when necessary)
- Step 9: Document analysis

See Section 3 of draft guidance for more details

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Pre-Analysis Work

- Step 1: Determine need for analysis
  - » PM hot-spot analyses required for projects of local air quality concern
  - » Draft guidance relies on existing interagency consultation process
- Step 2: Determine approach, models, and data
  - » Geographic area (the “project area”) and emissions sources
  - » General analysis approach and analysis year(s)
  - » PM NAAQS and number of calendar quarters
  - » Type of PM emissions
  - » Models and methods
  - » Project-specific data for emissions and AQ modeling

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Steps 3 and 4: Emissions Modeling

- Estimate emissions from the project:
  - » Motor vehicle exhaust and brake/tire wear (EMFAC in CA)
  - » Road/construction dust (use AP-42 or local methods, when necessary)
  - » Construction equipment emissions (when necessary)
- When needed, estimate emissions from other sources, e.g.:
  - » Locomotive emissions for freight rail terminal
  - » Activity on adjacent highway that is significantly affected by the project
- See Sections 5, 6, and 8 of draft guidance as well as Appendices G, H, and I

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Using EMFAC to Develop Emission Factors

A. Divide project into links to account for emissions at different locations and speeds
   - » Roadway link (highway and intersection projects)
   - » Off-network link (transit and other terminal projects)

B. Determine number of EMFAC runs
   - » In most cases, one run is needed unless fleet mix or activity varies by time period or activity.

C. Specify Basic Scenario Inputs
   - » Select geog area, year, & determine if fleet activity varies by season or month
   - » Select annual average or develop month/season scenarios
   - » Modify vehicle classes if needed

D. Configure Emission Factor Outputs and Edit Program Constants
   - » In EMFAC mode, configure temp, relative humidity and speed
   - » Select output particulate and summary rate file
   - » Change distributions of VMT, trips, & vehicle pop. to reflect fleet mix

E. Generate emission factors for air quality modeling
   - » AERMOD (grams/hour)
   - » CAL3QHCR (grams/vehicle-mile)

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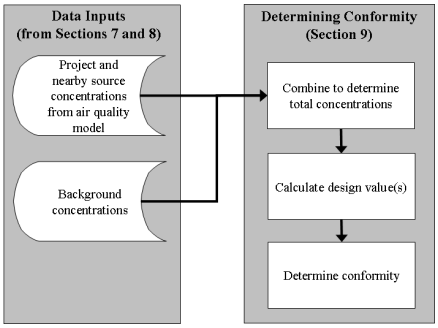
Steps 5, 6, and 7

- These steps cover air quality modeling, determining background, and calculating design values based on:
  - » Air quality modeling results (project and nearby sources) and
  - » Air quality monitoring data (background from other sources)



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Step 5: Air Quality Modeling

A. Select air quality model
B. Characterize emission sources (location, timing, use emission rates for project and nearby sources)
C. Obtain representative meteorological and other data
D. Specify receptors throughout project area
E. Run air quality model

- See Section 7 of draft guidance for more
- Draft guidance consistent with how air quality modeling done for other regulatory programs
  - » Relies on EPA's "Guideline on Air Quality Models" (Appendix W to 40 CFR Part 51)

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Recommended AQ Models

Type of Project	Recommended Model
Highway and intersection projects	AERMOD, CAL3QHCR
Transit, freight, and other terminal projects	AERMOD
Projects that involve both highway/intersections and terminals, and/or nearby sources	AERMOD

Note: Alternate models determined on case-by-case basis through Appendix W process

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Place Receptors

- Receptors are locations where an air quality model predicts air quality concentrations
- Conformity rule requires NAAQS to be evaluated "at appropriate receptor locations"
- In March 2006 final rule, EPA stated that guidance would be consistent with $PM_{2.5}$ monitoring regs
- Draft includes general guidance for all PM NAAQS
  - » Place receptors to model highest concentrations
- Also includes additional guidance for $PM_{2.5}$ NAAQS
  - » Population-oriented (for 24-hour and annual $PM_{2.5}$ NAAQS)
  - » Community-wide air quality (for annual $PM_{2.5}$ NAAQS only)

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Step 6: Determine Background Concentrations

- Includes other sources that affect concentrations in project area
- Options in draft guidance:
  - » Use representative AQ monitoring data from one monitor or interpolate between several monitors
  - » Adjust monitoring data based on SIP or other modeling results
  - » Other methods
- See Section 8 of draft guidance for more

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Step 7: Calculate Design Values

- For PM hot-spot analyses, a design value is a statistic that describes a future air quality concentration in the project area that can be compared to a NAAQS
- Draft PM hot-spot guidance describes how to calculate design values (including rounding conventions) for:
  - » Annual $PM_{2.5}$ NAAQS
  - » 24-hour $PM_{2.5}$ NAAQS
  - » 24-hour PM_{10} NAAQS
- Conformity is met if the design value for every appropriate receptor in the build scenario is less than or equal to the NAAQS or the same receptor in the no-build scenario
  - » May be certain cases where a possible "new" violation in the build is relocated from a different receptor in the no-build
- See Section 9 of draft guidance for more

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Appropriate Receptors for Annual $PM_{2.5}$ NAAQS

- After design values are calculated, it may be necessary to determine whether a receptor is appropriate to compare to the annual $PM_{2.5}$ NAAQS
  - » Unnecessary if conformity met at all receptors
  - » Unnecessary for 24-hour $PM_{2.5}$ or PM_{10} NAAQS
- Appropriate receptors for annual $PM_{2.5}$ NAAQS must represent "community-wide air quality"
  - » Draft guidance is consistent with how NAAQS is established and monitored for air quality planning purposes
- See Section 9.4 of draft guidance for further information and examples

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Remaining Steps

- Step 8: Consider mitigation or control measures (when necessary)
  - » Section 10 of draft guidance outlines measures by category:
    - – Retrofitting, replacing vehicles/engines, and using cleaner fuels
    - – Reduced idling programs
    - – Transportation project design revisions
    - – Fugitive dust control programs
    - – Addressing other sources of emissions
    - – Other measures may be available
- Step 9: Document analysis

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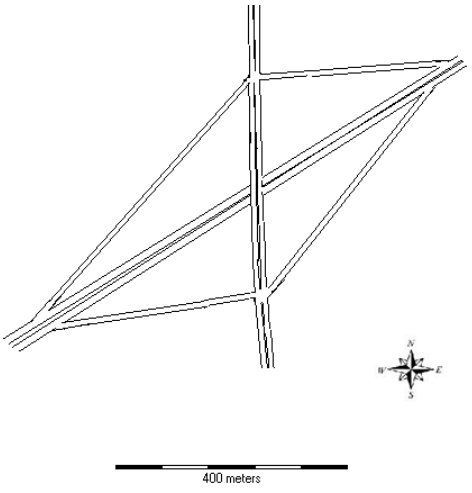
Abbreviated Example of a Proposed Highway Project

Project: A state DOT is building a new highway interchange and exit ramps are being added to a 6-lane freeway to allow trucks access to local businesses



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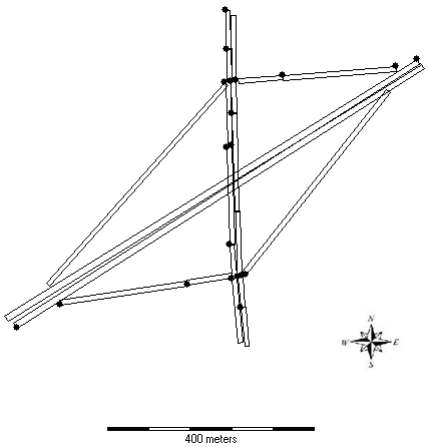
Defining Links and Running EMFAC

Project involves three basic link types with unique average speeds:

- Free-flow driving
- Intersection approach/ deceleration and idle
- Intersection departure/ acceleration



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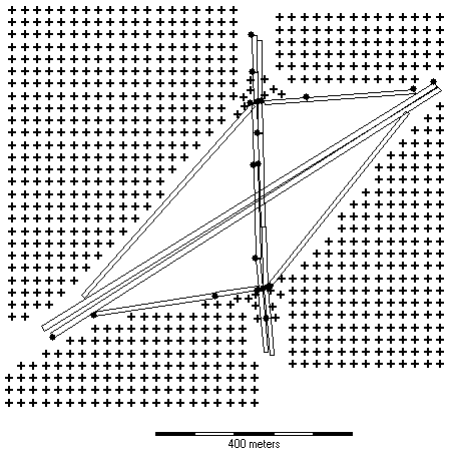
Placing Receptors and Running Air Quality Model

- Either AERMOD or CAL3QHCR could be used
- Receptors placed throughout project area, and model is run
- Separate from modeling, representative background data is obtained



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Determining Conformity

At highest receptor: 14.5 µg/m^3

Annual $PM_{2.5}$ NAAQS: 15.0 µg/m^3

Conformity is met at all receptors, since the design value at the receptor with the highest $PM_{2.5}$ concentration is below the NAAQS

Note: Since project meets conformity requirements at all receptors, no need to determine whether receptor is appropriate for annual $PM_{2.5}$ NAAQS

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Appendices for Draft Guidance

- App A: Clearinghouse of resources for PM hot-spot analyses
- App B: Examples of projects of local air quality concern
- App C: Projects needing analyses in certain PM_{10} areas
- App D: How to characterize intersection links for MOVES
- App E/F: Abbreviated PM hot-spot analysis examples (using MOVES) for a highway and transit project
- App G/H: Examples on how to configure and run EMFAC for a highway and transit project
- App I: Estimating locomotive emissions
- App J: Air quality modeling inputs and other details
- App K: Examples of how to calculate design values

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Public Comment on Draft Guidance

- EPA is seeking comment on all aspects of the draft guidance and the following questions:
  - » Does the draft guidance provide sufficient information on how to configure and run MOVES2010 and EMFAC2007 at the project level?
  - » Do the air quality modeling sections of the draft guidance and references to other existing documents provide sufficient detail for air quality modelers to conduct PM hot-spot analyses using AERMOD or CAL3QHCR?
  - » Is there sufficient information in the draft guidance to calculate design values and determine appropriate receptors? If not, what additional information is necessary?
  - » Are there issues that the draft guidance does not address that should be addressed in the final guidance or in other EPA efforts?
  - » What types of outreach, training, and other technical assistance would be helpful in implementing the final guidance?
- EPA encourages specific details and/or examples whenever possible

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Planned Outreach on Draft Guidance

- Conference calls with stakeholder groups
- Webinar being planned for late June/early July (will be open to all interested parties)
- Conference presentations

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Potential Future Training Efforts

- PM hot-spot guidance training course
- MOVES project-level training
- AERMOD training and support
- Any other ideas?

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Contact Information

- Comments on draft guidance due July 19 and can be sent to PMhotspot-comments@epa.gov
  - » Comments can also be sent by mail or fax (see Federal Register)
- Federal Register notice, draft guidance, fact sheet, conformity regulations, and other background at: www.epa.gov/otaq/stateresources/transconf/policy.htm
- Any questions on draft guidance? Interested in webinar?
  - » Contact Meg Patulski at:
    - – (734) 214-4842 or
    - – patulski.meg@epa.gov

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